

A recent multi-state measles outbreak: Highlighting the need for immunization

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Immunization Conferences
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Measles



Measles

- Paramyxovirus (RNA)
- Highly contagious viral illness – respiratory/airborne spread
- Near-universal infection of childhood in prevaccination era
- Rare in US now
- Common and often fatal in developing areas

Measles Pathogenesis

- Respiratory transmission of virus
- Replication in nasopharynx and regional lymph nodes
- Primary viremia 2-3 days after exposure
- Secondary viremia 5-7 days after exposure with spread to tissues

Measles Clinical Features

- Incubation period 10-12 days
- Prodrome*
- Stepwise increase in fever to 103°F or higher
 - Cough, coryza, conjunctivitis
 - Koplik spots

Measles Clinical Features

Rash

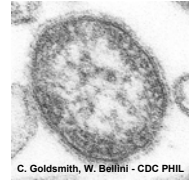
- 2-4 days after prodrome, 14 days after exposure
- Maculopapular, becomes confluent
- Begins on face and head
- Persists 5-6 days
- Fades in order of appearance

Measles Complications

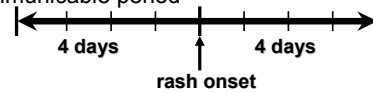
Condition	Percent reported
Diarrhea	8
Otitis media	7
Pneumonia	6
Encephalitis	0.1
Hospitalization	18
Death	0.2

Based on 1985-1992 surveillance data

Measles



- Acute viral illness
 - fever, rash
 - cough, coryza, conjunctivitis
- Highly infectious
 - Droplet or airborne
- Incubation: 7 – 18 days
- Communicable period



Probable Case Definition

- Generalized maculopapular rash ≥ 3 days
- Fever $\geq 101^{\circ}\text{F}$ (38.4°C)
- Any one of
 - cough
 - coryza
 - conjunctivitis

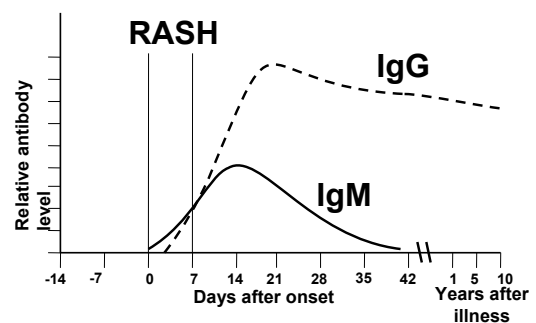
Confirmed Case Definition

- Generalized maculopapular rash ≥ 3 days
- Fever $\geq 101^{\circ}\text{F}$ (38.4°C)
- Any one of
 - cough
 - coryza
 - conjunctivitis
- Laboratory confirmation or epidemiologic link

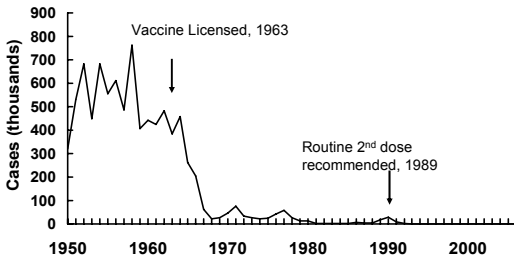
Laboratory Diagnostic Methods

- Serology
 - IgM antibodies
 - IgG antibodies
- Real-time reverse transcription polymerase chain reaction (RT-PCR)
- Conventional RT-PCR
- Viral culture

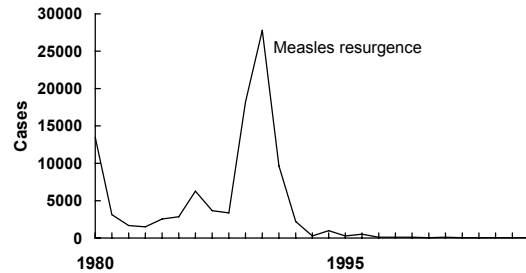
Measles Antibody Response



Measles—United States, 1950-2006



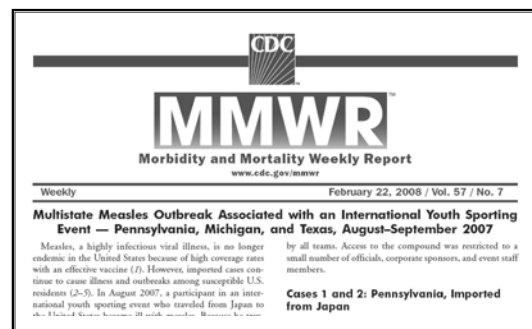
Measles—United States, 1980-2006



Measles in the United States 2002–2007

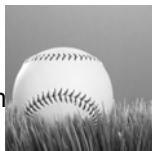
Year:	2002	2003	2004	2005	2006	2007
# cases US	44	56	37	66	55	43
# cases MI	0	2	0	1	1	3

2007 multi-state measles outbreak (*MMWR* 2008;57:169-173 2/22/2008)



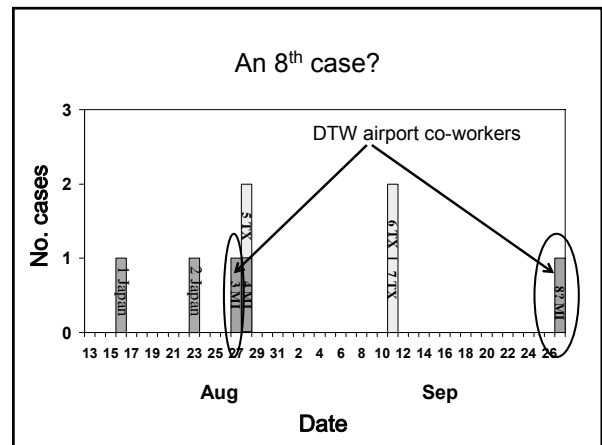
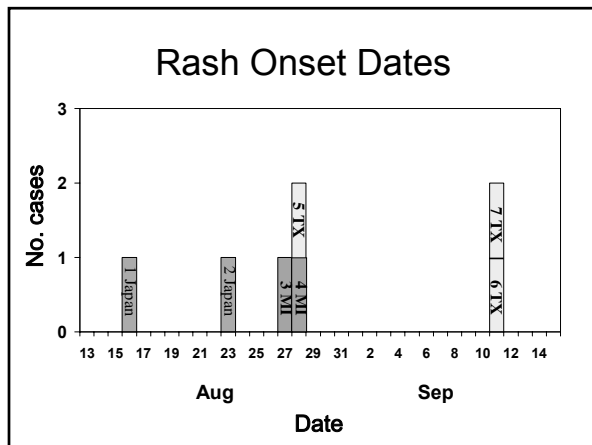
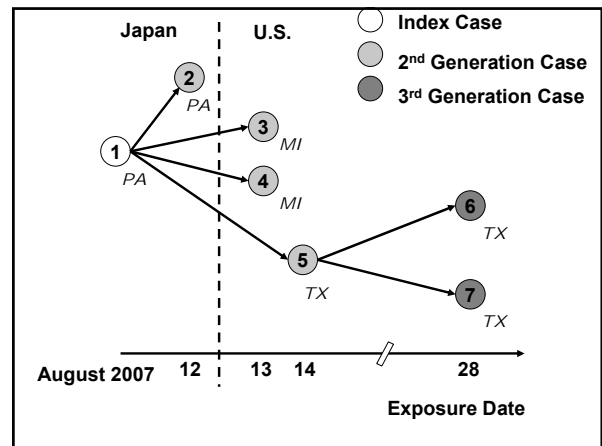
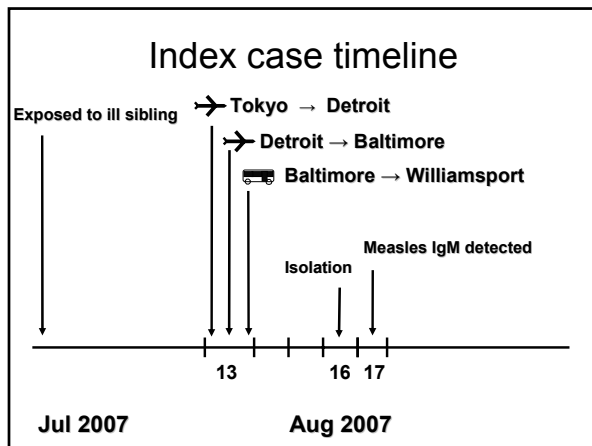
International Youth Sporting Event – Little League World Series

- Held annually in Williamsport, Pennsylvania
- August 17 – 26, 2007
- 8 US and 8 international teams
- 200 boys aged 10 – 13 years
- Residential compound
- Estimated attendance 265,000

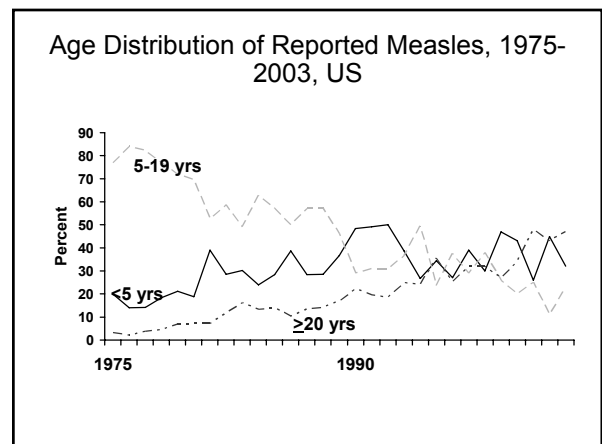


Index Case History

- Exposed to measles-compatible illness July 2007, Japan
- Vaccination status unknown
- August 11: sore throat, malaise
- August 13:
 - Tokyo → Detroit
 - Detroit → Baltimore
 - Baltimore → Williamsport, Pennsylvania
- Investigation initiated



- ### ? Case 8 ?
- 32 y.o. male DTW airport worker
 - Coworker of case 3
 - Rash onset 9/27/07 – 2 incubation periods after case 3 - missing link between?
 - Underscores challenges



Measles: lessons learned (or re-learned)

- Measles eliminated in US but threat exists from abroad
- Highly communicable
- Shift in age distribution of cases from pre-vaccine era – cases now as/more likely to be adult than child
- Risk of US becoming re-endemic
- **High population immunity is key – outbreaks result if not**
- International travelers need documented immunity
- HCWs need documented immunity